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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/534,204	03/24/2000	Shinji Imai	Q56555	2972

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EXAMINER	
LEE, SHUN K	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	09/534,204	IMAI ET AL.	
	Examiner	Art Unit	
	Shun Lee	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,59,62 and 64-69* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,59,62 and 64-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6 October 2005 has been entered.

Election/Restrictions

2. Applicant's election without traverse of species I (claims 1-8) in Paper No. 12 has been acknowledged.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-8, 59, 62, and 64-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karellas (US 5,864,146) in view of Perez-Mendez (US 5,596,198), Takahashi *et al.* (US 5,059,794), and Oikawa *et al.* (US 5,483,071).

In regard to claims **5-7**, **65**, and **68**, Karellas discloses (Fig. 37) an image read-out system comprising:

(a) a stimulating light source (1302) which emits stimulating light (1310) in a wavelength range of not shorter than 600 nm (column 34, lines 54-63),

(b) a stimulating light scanning means which causes the stimulating light (1310) emitted from the stimulating light source to scan (column 34, lines 54-56) a stimulable phosphor sheet (1306) having a layer of stimulable phosphor which emits stimulated emission in a wavelength range not longer than 500 nm (column 35, lines 1-8) in proportion to the stored energy of radiation upon exposure to the stimulating light (1310),

(c) a solid image sensor (electronic area detector 1312) having a photoconductive material layer the major component of which is a-Se (*i.e.*, amorphous selenium; column 40, lines 1-9) and which exhibits electric conductivity upon exposure to the stimulated emission from the stimulable phosphor sheet (1306), and

(d) an image signal obtaining means (*i.e.*, pixelated readout; column 40, lines 1-9) which detects electric charges generated in the photoconductive material layer of the solid image sensor (electronic area detector 1312) when the stimulable

phosphor sheet (1306) is exposed to the stimulating light (1310) and stimulated emission emitted from the stimulable phosphor sheet (1306) impinges upon the photoconductive material layer, and detects an image signal representing an image stored on the stimulable phosphor sheet (1306).

While Karellas also discloses (Fig. 5) that an image sensor comprises pixels disposed in a first direction and a second direction perpendicular to the first direction, wherein the pixels disposed in the first direction are separated by a pixel element pitch, so that each pixel in the first direction is in a one-to-one correspondence with a picture element and (column 40, lines 1-9) obtaining an image signal by pixelated readout of the amorphous selenium image sensor, the system of Karellas lacks that each pixel comprises of a spaced apart electrode in one-to-one correspondence to each pixel and wherein the electrodes are disposed on both sides of the photoconductive material layer with an electric voltage imparting means which imparts an electric voltage to a 1 μm to 100 μm (or 10 μm to 50 μm) thick photoconductive material layer so as to apply an electric field which generates an avalanche amplification effect in the photoconductive material layer of the solid image sensor during impingement of the stimulated emission. However, pixelated readout of photoconductive image sensors is known in the art. For example, Perez-Mendez teaches (Figs. 2, 3, and 5; column 6, lines 57-67) that a-Se image sensors comprises a rectangular array of spaced apart pixel electrodes and wherein the electrodes (55, 62) are disposed on both sides of the photoconductive material layer (57). Further, a-Se photoconductive material layer properties are well known in the art. For example, Takahashi *et al.* teach (column 2, lines 18-22 and 47-58; column 7, lines

15-39) to apply an electric field to an a-Se photoconductive material layer (*e.g.*, 2 μm thick; column 6, lines 15-39) sufficient for avalanche amplification in order to increase optical detection sensitivity when using a laser stimulable phosphor. Oikawa *et al.* teach (Fig. 7) to provide a 4 to 20 μm thick (column 4, lines 21-29) a-Se photoconductive material layer (13) sandwiched by electrodes (12, 41) with one (41) of the electrodes (12, 41) connected to a FET (45) wherein the photoconductive film (13) is for converting (column 2, lines 15-16) an optical image into an image based on electric charges with an avalanche effect in order to obtain an excellent electron multiplying function (column 4, lines 21-29). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to apply a sufficient electric field to (*e.g.*, a 10 μm thick) a-Se photoconductive material layer at each spaced apart pixel electrode in the system of Karellas during pixelated readout, in order to increase optical detection sensitivity as taught by Takahashi *et al.*

In regard to claims **1-3**, **62**, **64**, **66**, **67**, and **69**, the method steps are implicit for the modified apparatus of Karellas since the structure is the same as the applicant's apparatus of claims 5-7, 65, and 68.

In regard to claim **4** (which is dependent on claim 1) and claims **8** and **59** (which are dependent on claim 5), the system of Karellas lacks a fluctuation suppressing means that suppresses image signal fluctuations due to fluctuation in the electric field applied to the photoconductive material layer (*e.g.*, by correcting the image signal according to applied electric field fluctuations from voltage power source fluctuations). However, photoconductor quantum efficiency (η) as a function of applied electric field

(E) is well known in the art. For example, Takahashi *et al.* (Fig. 3) teach that there is a steep increase in quantum efficiency (η) when the applied electric field (E) increases. In addition it is important to recognize (see for example Eq. 4 of Takahashi *et al.*) that quantum efficiency (η) denotes efficiency for conversion of light (L) into charge (Q). Thus Q is proportional to η which is a function of both L and E and image signal $S = g(Q) = g(h_A(L_E,E)) = f_A(L_E,E)$. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a fluctuation suppressing means (*e.g.*, $S = f_A(L_E,E)$) in the system of Karellas, so that the image signal (S) is indicative of the stimulated emission (L_E) and thus representative of the image stored on the stimulable phosphor sheet.

Response to Arguments

6. Applicant's arguments filed 6 October 2005 have been fully considered but they are not persuasive.

Applicant argues (second paragraph on pg. 9 of remarks filed 6 October 2005) that the photoconductive material layer in the solid-state detector of the present invention is a single layer and is not divided into elements. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (*i.e.*, the photoconductive material layer is a single layer and is not divided into elements) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argues (third paragraph on pg. 9 to second paragraph on pg. 10 of remarks filed 6 October 2005) that the issue is not bodily incorporation of the teachings of the reference, but a difference in structural effect (electron migrations) based on avalanche voltage. Examiner respectfully disagrees. The test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In this case, Takahashi *et al.* state (column 2, lines 47-58) that "In a radiation imaging apparatus including a laminate structure consisting of a phosphorescent layer, a first light-transmissive electrode, a photoconductor layer, an insulating layer and a second light-transmissive electrode, the objects of the invention described above can be accomplished by the arrangement wherein a voltage to be applied across the first and second electrodes is increased to a sufficiently high level and the photons emitted from the phosphorescent material causes avalanche multiplication of the electrons and/or positive holes generated inside the photo-conductor layer by field sweep inside the photoconductor layer". Thus Takahashi *et al.* teach avalanche amplification of electrons and/or positive holes in a photoconductor layer from photons emitted from a phosphorescent material. Further, Oikawa *et al.* teach (Fig. 7) to provide a 4 to 20 μm thick (column 4, lines 21-29) a-Se photoconductive material layer (13) sandwiched by electrodes (12, 41) with one (41) of the electrodes (12, 41) connected to a FET (45) wherein the photoconductive film (13) is for converting (column 2, lines 15-16) an optical image into an image based on electric charges with an avalanche effect in order to obtain an excellent electron multiplying function (column 4, lines 21-29). Therefore it would have been obvious to one having ordinary skill in the art at the time of the

invention to apply a sufficient electric field to (*e.g.*, a 10 μm thick) a-Se photoconductive material layer at each spaced apart pixel electrode in the system of Karellas during pixelated readout, in order to increase optical detection sensitivity when converting an optical image (*e.g.*, the optical image emitted when a stimulable phosphor sheet is stimulated by stimulating light) into an image based on electric charges.

Applicant argues (third paragraph on pg. 10 to first paragraph on pg. 11 of remarks filed 6 October 2005) that the detector including an element such as TFT would be destroyed by the electric field which causes avalanche amplification. Examiner respectfully disagrees. It should be noted that this argument rests on at least two unsupported assumptions. First, there is no evidence provided that the detector including elements such as TFT wherein the elements are located within the avalanche amplification electric field. Second, there is also no evidence provided that even if the elements are located within the avalanche amplification electric field, that the avalanche amplification electric field is of a magnitude sufficient to cause damage to the elements such as TFT. On the contrary, detectors comprising of elements such as FET and wherein the detectors are operated with avalanche amplification electric fields are well known in the art (see *e.g.*, Oikawa *et al.*).

Applicant argues (second paragraph on pg. 11 to fourth paragraph on pg. 12 of remarks filed 6 October 2005) that Takahashi *et al.* fail to teach or suggest application of the electric field which causes avalanche amplification during readout. In response to applicant's argument, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary

reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Applicant argues (last paragraph on pg. 12 of remarks filed 6 October 2005) that the 10-50 micrometers photoconductive material thickness is not taught by the 2 micrometer thickness cited. Examiner respectfully disagrees. It should be noted that a prima facie case of obviousness exists where the claimed ranges and prior art ranges are close enough that one skilled in the art would have expected them to have the same properties. Takahashi *et al.* state (column 6, lines 20-24) that "It has been confirmed that so long as amorphous Se is used at the photoconductor film, the preferred range of the field intensity between the electrodes does not change irrespective of the film thickness". Thus Takahashi *et al.* expressly teach that the amorphous Se film thickness is not critical. Oikawa *et al.* is provided as further evidence that the amorphous Se film thickness is not critical. Therefore the express disclosure that the amorphous Se film thickness is not critical in combination with the 2 micrometer thickness example and/or 4 to 20 micrometer thickness example provides a prima facie case that a 10-50 micrometers amorphous Se thickness would be obvious to one of ordinary skill in the art.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Column 4, lines 55-64 of DE 44 22 928 A1 (Oikawa *et al.*)

corresponds to column 4, lines 21-29 of US 5,483,071 indicating that "αm" should probably be "μm".

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL

CONSTANTINE HANNAHER
PRIMARY EXAMINER